



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : B65D 25/08, 81/32, 17/00, 51/28</p>	<p>A1</p>	<p>(11) International Publication Number: <b>WO 99/44901</b> (43) International Publication Date: 10 September 1999 (10.09.99)</p>
<p>(21) International Application Number: PCT/AU99/00138 (22) International Filing Date: 8 March 1999 (08.03.99) (30) Priority Data: PP 2234 6 March 1998 (06.03.98) AU (71) Applicant (for all designated States except US): SOUTH-CORP AUSTRALIA PTY. LTD. [AU/AU]; Level 23, King William Street, Adelaide, S.A. 5000 (AU). (72) Inventors; and (75) Inventors/Applicants (for US only): WITTIG, Perry, Raymond [AU/AU]; 63 Monaro Street, Merimbula, NSW 2548 (AU). SOUTH, Roland, David [AU/AU]; 18 Windward Avenue, Mosman, NSW 2088 (AU). (74) Agent: FREEHILLS PATENT ATTORNEYS; MLC Centre, Level 32, Martin Place, Sydney, NSW 2000 (AU).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>
<p>(54) Title: A CONTAINER</p> <p>(57) Abstract</p> <p>A container (70) for mixing a first and a second substance, the container comprising a bottle (72) defining a chamber adapted to receive the first substance, an opening (80) being provided in the bottle (72), the opening (80) having male thread (76) formed thereon. The container (70) further incorporating a cap (78) for closing the opening (80), and having cooperant female threads to engage with the male thread (76), and a button (98). The container further includes a cartridge (82) adapted to be located in the opening (80). The cartridge (82) defining a cavity (94) which is adapted to receive the second substance, the cartridge (82) including a rupturable membrane (84). In use, the button (98) is able to be actuated so as to apply a rupturing force to the membrane (84) which will cause the membrane to rupture and thereby cause the second substance to discharge from the cavity (94), through the opening (80), into the chamber.</p>		

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## A Container

### Field of the invention

The present invention relates to containers and more particularly but not exclusively to beverage containers particularly bottles.

### 5 Background of the invention

Traditionally beverages, including soft drinks, merely contain the liquid to be consumed. If a material is to be added to the liquid, this can only be done after the bottle cap has been removed, and more than likely the contents delivered into a container for mixing.

10 The above discussed previously available bottles suffer from the disadvantage that if an additional substance is to be added to the liquid, the additional substance, such as a tablet, needs to be handled. This is hygienically undesirable.

Australian patent application no. 19972/97 discloses a bottle cap which can be used to store a soluble tablet until it is desirable to mix the tablet with the liquid contents of the bottle. The bottle cap consists of a closeable cover located around the mouth of the bottle having a breakable seal adjacent to the  
15 mouth of the bottle and which seals the liquid content of the bottle. A soluble tablet is positioned above the breakable seal within the bottle cap and is covered with an upper foil cover.

When it is desired that the soluble tablet be mixed with the content of the bottle, pressure is applied to the upper foil cover which causes the soluble tablet to press against the breakable seal, thereby causing it to rupture. Consequently, the tablet is mixed with the content of the bottle.

20 A disadvantage of this bottle cap is that the tablets must be located solely within the bottle cap of the bottle. Hence, the tablets must be supplied and manufactured with the bottle cap, rather than being sold as separate discrete items.

### Summary of the invention

25 According to a first aspect of the present invention, there is provided a container for mixing a first and a second substance, the container including:

a vessel defining a chamber adapted to receive the first substance, an opening being provided in the vessel, the opening having closure formations thereon;

a closure member for closing the opening in the vessel, the closure member having cooperant closure formations thereon adapted to engage with the closure formations on the vessel, and actuation  
30 means on the closure member;

a cartridge adapted to be located in or adjacent said opening, said cartridge defining a cavity which is adapted to receive the second substance, the cartridge including a rupturable membrane;

the actuation means being adapted to be actuated so as to rupture the membrane and thereby cause the second substance to discharge from the cavity, through the opening, into the chamber.

Preferably the cartridge is clamped between the closure member and the vessel when the closure member is operatively engaged with the vessel.

- 5 Preferably the vessel is of bottle or jar shape having a cylindrical neck and the cartridge is shaped to nest within the neck.

Preferably the closure formations on the vessel have screw threads formed on the outer surface of the neck, and closure formations on the cap include cooperant screw thread formations.

- 10 Preferably the cartridge includes a hollow body and the rupturable membrane is sealed to the end of the body near to said chamber.

Preferably the cartridge includes an outwardly extending flange which is adapted to be clamped between the vessel and the closure member when the closure member is operatively engaged with the vessel.

- 15 Preferably the cartridge further includes a top membrane which sealingly encloses the second substance within the cylindrical body.

Preferably the top membrane includes a deformable sheet material which is adapted to deform when the actuation means is actuated.

Preferably the top membrane also includes or comprises a fluid impervious foil material.

More preferably the rupturable membrane includes or comprises a fluid impervious foil material.

- 20 Typically the rupturable membrane includes lines of weakness.

Advantageously the closure member is provided with a tamper evident device, or a locking or retaining band or cap which prevents the actuation means from being actuated unless the locking or retaining band or cap is first disengaged or removed.

- 25 Preferably the actuation means is a button attached to the closure member at one end by a hinge, and at the other by a moveable end.

Typically the moveable end includes one or more breakable tabs.

Advantageously actuation of the actuation means is applied by one of the following: manually; hydraulically; pneumatically; mechanically..

Preferably the cartridge further includes a piercing element that contacts the rupturable membrane.

- 30 According to a second aspect of the present invention is a container assembly surrounding a space, said assembly having at least one wall portion providing a chamber containing a substance to be delivered to

said space, and a frangible diaphragm separating said chamber from said space, said wall portion being deformable so that a user can apply pressure to said diaphragm to thereby rupture same.

Preferably said assembly includes a container and lid, with said lid providing said wall portions.

Preferably said lid includes a body, which body provides means to secure the lid to the container.

5 In a further aspect of the invention, there is also disclosed a container having:

a hollow body to receive a first substance, said body having at least one portion containing a sealable opening therein; and

a closure means applied to said sealable opening, said closure means including a securing portion to engage the body to secure the closure means thereto, a chamber to enclose a second substance to be delivered to the first substance, said chamber being at least partly defined by a rupturable membrane separating the chamber from the interior of said body, said membrane being rupturable by pressure being applied thereto to enable said second substance to be delivered to the first substance via said sealable opening.

10 Preferably said closure means includes a closure body having means to engage said hollow body to secure the closure means thereto.

Preferably said membrane is attached to said housing.

Preferably said container further including a cover removably attached to said body.

The invention further provides a closure means to be secured to a sealable opening in a container, said closure means including;

20 a securing portion to engage the container to secure the closure means to the container;

a chamber means formed from a rupturable membrane portion and a deformable wall portion to enclose a substance to be delivered to the interior of the container, said rupturable membrane separating the chamber means from the interior of the container, said membrane being rupturable by pressure being applied to said deformable portion to enable said substance to be delivered to the interior of the container; and

25 said chamber means including said chamber being received by said closure means and being secured in or adjacent to said sealable opening by said closure means being secured to said container. According to the invention there is provided a container comprising:

30 a wall which encloses a space, the space being adapted to contain a first substance, the wall having an opening therein;

a wall portion adapted to close the opening in said wall, said wall portion being formed by an inner rupturable diaphragm, and an outer flexible membrane, a chamber being defined between said diaphragm and said membrane, the chamber being adapted to contain a second substance;

the arrangement being such that distortion of the flexible membrane is adapted to rupture the diaphragm

- 5 allowing the second substance to pass from the chamber into the space to thereby mix with the first substance in said space.

The chamber may comprise a fluid impervious chamber and said diaphragm may be adapted to be ruptured when the pressure in said chamber increases as a consequence of distortion of said flexible membrane. Alternatively the membrane may be formed of a fluid pervious material and the diaphragm  
10 may be rupturable by physical means.

One arrangement is for the flexible membrane and the diaphragm to be linked via a physical link, distortion of the flexible membrane being transmitted to the diaphragm by the physical link, to thereby rupture the diaphragm. The physical link may comprise the substance itself, or may comprise a separate component.

- 15 Preferably the wall includes a neck which defines an opening into the space, the container further including a cap adapted to engage with the neck, the wall portion being shaped and sized to be held in position on the neck by the cap with the flexible membrane being accessible when the cap is in engagement with the neck.

- Preferably the wall portion is separately formed from the remainder of the wall and is also separate  
20 from the cap. Typically the wall portion is in the form of a blister pack capsule.

- The cap may have an opening therein and the wall portion either extends through or be accessible through said opening. The wall portion may include a flange which extends around said chamber, said flange adapted to be clamped between said neck and said cap. The neck preferably has thread formations formed thereon and the cap has cooperatively shaped thread formations thereon. The  
25 opening in the cap is preferably of circular form and may be generally axially aligned with the threads on the cap. In the preferred form of the invention the neck has an annular shaped end face and an inner surface of the cap has a cooperatively shaped annular surface, the wall portion being gripped between the two annular surfaces when the container is in its assembled condition. The flexible membrane may have a generally convex form and be shaped to extend out of said circular opening in the cap when the  
30 cap is in engagement with the neck.

The cap may have lid attached thereto which serves as a protective shield for the flexible membrane. Preferably the lid is hingedly connected to the cap, the lid being moveable between a closed position in which the flexible membrane is protected beneath the lid, and an open position in which the flexible membrane is exposed.

According to yet another aspect of the invention, there is provided a method of delivering a first substance to a space within a container, the container having at least one wall portion that is deformable and is located adjacent the space, the wall portion located adjacent a frangible diaphragm so as to thereby form a sealed chamber, the frangible diaphragm separating the chamber from the space, the  
5 method including the first step of providing said first substance within the chamber and then the second step of applying pressure to the wall portion so that the frangible diaphragm ruptures and releases the first substance into the space.

The invention extends to a wall portion adapted to be used in a container of the type defined above.

Where in the specification the words "comprising", "comprises" or words derived therefrom, are used,  
10 these words should not be interpreted to have a narrow or exhaustive meaning. Rather, they must be interpreted as having broad scope so that they have an inclusive meaning.

#### **Brief description of the drawings**

It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings.  
15 All of these different combinations constitute various alternative aspects of the invention.

A number of preferred forms of the present invention will now be described by way of example with reference to the accompanying drawings wherein:

Figure 1 is a side elevation of an unclosed bottle in accordance with the present invention;

Figure 2 is an exploded view of a capsule mounted in the closure of Figure 1;

20 Figure 2A is an underneath plan view of the capsule mounted of Figure 2;

Figure 3 is a cross section of the bottle of Figure 1 with an assembled capsule and closure;

Figure 4 is a perspective view of a cup closed by a lid;

Figure 5 is a cross section through the lid of Figure 4;

Figure 6 is a perspective view of a container closed by a lid; and

25 Figure 7 is a cross section through the container and lid of Figure 6;

Figure 8 shows an exploded view of a further embodiment of the present invention illustrating the container which includes the features of the vessel, the closure member, cartridge and actuation means in accordance with the present invention;

Figure 8A shows another embodiment of a closure member of the present invention, that is larger and  
30 which can be used in replacement of the cartridge illustrated in Figure 8;

Figure 9 shows a cross section view of the container of Figure 8 in accordance with the present invention;

Figure 10 shows in cross-section view, a further embodiment of a of the present invention;

Figure 11 shows yet another embodiment of a cartridge used with the container of the present invention;

5 Figure 12 shows the cartridge of figure 11 in top view;

Figure 13 illustrates in cross-section, yet another embodiment of the container in accordance with the present invention;

Figure 14 shows the container of Figure 13 in exploded view; and

Figure 15 shows a further embodiment of a container in accordance with the present invention.

## 10 Detailed description of the embodiments

In figures 1, 2 and 3 there is depicted a bottle 10.

The bottle 10 includes a hollow body which is to receive a first substance (which may be a combination of substances) such as any one or combinations of any of the following: a liquid (eg. water, a soft drink or fruit juice); a granulated pourable substance; a substance that may be poured in and later set in the bottle; a solid, a gas; or any appropriate substance that can be placed into a container or bottle, or around which a container or bottle can be formed. The body 11 terminates at its upper end with a threaded neck 12 to which there is secured a cap assembly 13.

The cap assembly 13 includes a second substance 14 to be delivered to the interior of the body 11 so that the second substance 14 can dissolve, or interact in some other way with the first substance contained in the body 11.

The cap assembly 13 includes a closure body 22 having a threaded skirt 15 threadably engaged with the threaded neck 12. The upper extremities of the skirt 15 are formed integral with an annular flange 16 surrounding a central aperture 16A which will be closed by a capsule or cartridge 17A (hereinafter referred to as "capsule 17A").

25 The capsule 17A is an assembly of a housing 20 which provides a generally cylindrical chamber 19 therein to receive the second substance 14 (which may also be a combination of substances). The second substance being one which is to be mixed with, reacted with, interacted with or otherwise modify the first substance.

30 The cylindrical chamber 19 is closed off by means of a membrane 17 which is able to be ruptured if sufficient pressure is applied thereto. The membrane 17 is attached to the housing 20 by means of an annual flange 20B. The membrane 17 and flange 20B can be joined by any known appropriate process such as by the use of adhesives; hot melt glues, heat fusion, sonic welding etc.



The housing 20 is resiliently and/or plastically deformable or flexible so that a user may thereby engage either the second substance or the membrane 17 to apply a pressure, or force, to cause the membrane 17 to rupture. This enables delivery of the second substance to the interior of the body 11.

5 Preferably the housing 20 can be manufactured from any appropriate material such as: polymers; composites; laminates, laminates of plastic and metal foil; laminates of plastic and wax; materials which are transparent or translucent or opaque, or appropriate combinations of any of these. The material chosen must be such that it will not react with the second substance to be located in the housing 20.

10 The membrane 17 can also be manufactured from any appropriate rupturable material such as, for example metal foil; plastics sheet, polymeric sheet, paper; waxed paper etc. or appropriate combinations of any of these. The material selected must be such that it will not react with the first substance in bottle 10 (or its vapours) which it will contact on one side, and on its other side, it should not react with the second substance located in the housing 20.

Also attached to the body 22 is a cover 18 which is removable to expose the housing 20.

15 The capsule 17A, consisting of the housing 20 and membrane 17, encloses chamber 19 within which the second substance (which may be a liquid, solid, tablet, gas, to be delivered to the interior of the body 11) is sealingly enclosed.

The capsule 17A is preferably separately formed and inserted in the body 22. The capsule 17A may be secured to the body 22 by gluing, or heat fusion (or some other appropriate process), of the membrane 17 to the flange 16, but this securement is not essential.

20 Once the capsule 17A is assembled and sealed with a second substance therein the capsule 17A can be placed in position in the closure body 22, through the central aperture 16A adjacent the flange 16. The closure body 22 can then be screwed onto the threaded neck 12, thereby clamping flange 20B between flange 16 and the end of the neck 12.

25 If desired, the membrane 17 can include one or more lines of weakness which will reduce the amount of pressure required to rupture membrane 17. To also assist rupturing, if the second substance is not solid, but pourable granules or liquid, or gas, the inside surface of the housing 20 can include a sharp projection (see items 114 in figure 10 and item 116 in figure 11) so as to engage the membrane 17 and thereby rupture same with relative ease.

30 If desired, the housing 20 may incorporate a plunger or other member which applies pressure not directly to the membrane 17 to produce rupturing, but by interaction with the second substance, which in turn engages the membrane 17 to thereby rupture it.

In a more preferred embodiment the cap assembly 13 is a screw on cap which has received a capsule 17A. The capsule 17A includes a second substance in tablet form, such as any one of the following

trade mark substances: ENO, ALKA-SELTZER, BEROCCA, GATORADE, LUCOZADE, or any one of a myriad of substances or combinations of substances which are able to be added to liquids, drinks etc to form other liquids or drinks.

5 In Figures 4 and 5 of the accompanying drawings there is schematically depicted a cup or container 40 to which there is applied a lid 41. The cup 40 has an upper rim 42 to which the cap 41 is applied so as to be generally secured thereto. For example, the lid 41 may have a skirt 43 which frictionally engages the rim 42 to secure the lid 41 to the cup 40.

10 The lid 41 consists of a body 44 which includes the skirt 32 and a peripheral annular flange 45. The body 44 further includes a transverse wall 46 surrounded by the flange 45 and provides a plurality of cavities 47, 48 and 49 by means of raised wall portions 50.

Secured to the body 44 and being generally transversely co-extensive with respect to the wall 46 is a diaphragm 51 which sealingly closes the cavities 47, 48 and 49.

Located in the cavities 47, 48 and 49 can be a variety of liquid or particle substances.

15 In this particular example, the cap 41 could be used to deliver a variety of substances to hot water in the cup 40, which would have an upper level at or near the region of line 53. An air gap would therefore exist between the cap 41 and the upper level of the water. The cavity 47 may provide bread portions (toasted portions such as croutons) 55 while the cavities 48 and 49 could contain substances which when mixed with the water 52 would provide a soup.

20 The wall portions 50 are resilient so that a user may apply pressure thereto and exert pressure on the contents of the cavities 47, 48 and 49. The diaphragm 51 would be frangible so that upon being stressed would rupture with the result that the contents of the cavities 47, 48 and 49 would be delivered to the water. In that regard, it should be appreciated that the diaphragm 51 and the body 44 would be constructed from suitable materials to accommodate the contents of the cavities 47, 48 and 49 and the liquid contained in the cup 40. In particular, the diaphragm 51 could be a plastic or foil film and if so  
25 required may be perforated or weakened adjacent the cavities 47, 48 and 49 to facilitate rupture. Typically in use, the contents of the cavities 47, 48 and 49 would be pushed through the diaphragm 41 by thumb pressure applied to the raised wall portions 50.

If the cup 40 were to be used for coffee or tea etc, the cavities 47, 48 and 49 may contain milk, tea, coffee, sugar etc for mixing with water to form the drink.

30 In Figures 6 and 7 of the accompanying drawings there is schematically depicted a container 60 upon which there is mounted a cap 61. The container 61 has an upper annular lip 62 which engages an annular flange 63 of the lid 61 to secure the lid 61 to the container 60.

The lid 61 includes a body 64 which includes the flange 63 together with a side wall 65 which extends to an upper wall or top 66. The side wall 65 cooperates with the top 66 to provide a cavity 67. The cavity 67 is closed by means of a diaphragm 68 secured to the body adjacent the flange 63 so that the cavity 67 is generally sealingly closed.

- 5 Located in the cavity 67 is a substance 69 to be delivered to a liquid 70 (such as water) to be mixed with the substance 69. For example, in this embodiment the substance 69 is a powder however it should be appreciated that the substance 69 could also be a liquid.

At least part of the body 64, such as the top 66, is flexible so that a user may deform the body 64 and apply pressure to the substance 69. The diaphragm 68 is frangible so that upon being stressed, it  
10 ruptures with the result that the substance 69 is delivered to the liquid 70.

Again, the diaphragm 68 may be formed of plastics or foil material and if so required may be perforated or provided with a line of weakness.

The above described preferred embodiments may also be adapted to dispense pharmaceuticals, vitamins or even horticultural products.

- 15 Typically, in the above described embodiments the housing 20, wall 46 and body 64 would be formed of flexible plastics materials so that the various substances are covered by a "blister" portion, such as the wall portions 50, housing 20 and top 66.

In the above described embodiments the various substances to be delivered to a liquid are contained in a cap. However, a container could be constructed in which the substances are contained in cavities  
20 forming part of a sidewall and/or bottom wall of the container.

Preferably, once the membrane 17 and the housing 20 are joined to create the capsule 17A, the flange 20B will be die cut so as to form a number of locating ears or tabs or similar closure body engaging formations around the periphery as shown in Fig 2A.

- These ears or tabs function to retain the capsule 17A in the closure body 22 before and after dispensing  
25 the contents in the bottle 10. One benefit of this is to avoid the use of adhesives or other attachment methods to connect the capsule 17A to the closure body 22.

Under normal circumstances the flange 20B of the capsule 17A acts as a wad or gasket to seal the opening in the bottle 10 in conjunction with the closure body 22. However, if the ears or tabs are die cut therein, it will be necessary to ensure that the flange 20B has a continuous surface corresponding to the  
30 location of the rim of the bottle and adjacent the flange 16 on closure body 22, so that the flange 20B can fulfil its wad, seal or gasket function.

The die cut ears or tabs facilitate handling of the assembly of the capsule 17A and body closure 22 during bottle filling. A further benefit is by not being retained as part of the bottle, ie. fused to the neck opening, it thereby does not become a contaminant in the recycling of the bottle. Furthermore the

capsule 17A can be readily detached from the closure body 22 when necessary such as if the closure body 22 were to be recycled. The separateness of the capsule 17A from both the bottle and closure body 22 also offers versatility in loading of capsule 17A and subsequent loading of capsule 17A into closure body 22.

- 5 If the capsule 17A were to be attached to a can, the capsule 17A would be attached directly over the can opening via a foil closure, the diaphragm 17 of the capsule 17A then possibly forming a direct seal of the can opening or, alternatively, indirectly contributing to the sealing of the can by lying immediately above and in contact with a puncture portion of the foil closure and act as the seal. After delivery of the contents of capsule 17A contents to the can, the capsule 17A would be peeled away to reveal the
- 10 opening and make consumption of the resultant admixture through the opening possible There can be present a protective over-cap fitted to protectively cover the capsule 17A in all configurations which would be removable but which may or may not remain attached to the can or bottle or container.
- Any vessel capable of holding a liquid or other component of an admixture could have a capsule 17A assembly attached either by directly fusing the separate capsule 17A to the vessel or fitting a flanged
- 15 and threaded neck and corresponding closure body 22 containing a capsule 17A through an opening in any part of the main body of the container.

In one embodiment, the container could be a cardboard package which has attached thereto a capsule containing for example seeds in a sterile environment to protect the seeds. Inside the container could be located potting mix or enriched soil. Upon applying pressure to the capsule, the seed will be ejected into

20 the soil or potting mix. By then watering the soil, and opening the bottom corners of the container to allow roots to grow therethrough and water to pass out, the seedling can grow. Once to a predetermined size, the carton and seedling can be placed in soil. As the carton is preferably of the bio degradable type, it will degrade creating an optimum environment for the seedling to grow into a plant in the ground.

- 25 One of the advantages of the use of the capsule and the invention is the ability to keep separate and sterile the second substance. This could give the products a long shelf life.

Preferably, in embodiments of the above invention there is a space between the first substance in the container 10 and the membrane 17. This space is preferably occupied by air or a gas. This will allow the second substance to proceed into the container to mix or otherwise interact with the first substance. In

30 some circumstances such a space will not necessarily assist in the transfer of the second substance to the first, such as when both the first and second substances are liquids.

Referring to Figure 8, there is an exploded view of a container 70 for mixing a first substance and a second substance (not shown). The container comprises a vessel in the form of bottle 72 containing liquid water (refer to waterline 112 on figure 9) having a neck 74 which defines an opening in the form

of mouth 80. The neck 74 is provided with a male thread 76 for engagement with a cooperant female thread (feature 104 on figure 9), provided on a closure member in the form of cap 78.

The container 70 further includes a cartridge 82 which is adapted to be located within the mouth 80. The cartridge 82 has a rupturable membrane in the form of aluminium foil membrane 84, a body in the  
5 form of cartridge body 86 and a top cover in the form of top foil 88. The cartridge body 82 is of cylindrical shape and has an integrally formed flange 90 on its outer circumference which allows the cartridge to nest upon the neck 74.

Depending on the nature of the substance to be held by the cartridge 82, the top foil or seal 88 could be, if the substance is hygroscopic, made of aluminium or other appropriate metal foil. Whereas if the  
10 substance is not hygroscopic, the membrane or seal 88 can be made of a flexible material which does not break and which maintains a liquid tight seal, when stretched within the limits of operation of the container 70. As a third option, if it is desired to maintain the integrity of a liquid proof top seal 88, and a hygroscopic substance is held in the cartridge 82, a laminate of metal foil and flexible material can be provided, whereby the foil will rupture when the seal 88 is stretched during release of the substance, but  
15 the flexible membrane will not. Such an option may be required as some substances will absorb moisture vapour through polymeric materials, and if a metal foil is not included some substances will have their shelf life decreased.

The cartridge body 82 has a plurality of lobe members 92 integrally formed upon the surface of the flange 90 and extending around the circumference of the cartridge body 86 in equally spaced  
20 arrangement. The lobes 92 are able to engage with cooperant recesses 91 (refer to fig 9) formed within the inner housing of the cap 78, so as to assist the cartridge 82 to engage with the cap 78.

Within the cartridge body 86 there is defined a cavity 94 which is able to receive and store a second substance such as a soluble tablet (not shown) whilst the container is in use. Also shown in Figure 8A, is another cartridge of the same form as cartridge 82, however this cartridge happens to have a larger  
25 cartridge body 86 so that among other things, it can store greater quantities of the second substance if required.

Upon the top surface of the cap 78, there is provided an actuation means in the form of button 98. The cap 78 can include a tamper evident band around the region 96 which will be damaged and the damage visible if the button 98 has been moved since manufacture. Alternatively a retaining band or cap may  
30 be used around the cap 78 which must first be removed before the button 98 can be activated. This ensures that the integrity of whatever substances are contained within the cap 78 and bottle 72, is maintained.

Referring to Figure 9, there is shown a cross section of the container 70 of Figure 8 in assembled form, with the cartridge 82 containing a second substance 100 in the form of a soluble powder shown by

broken and straight lines. As can be seen in figure 9, adjacent to the bottom foil 84 is the content of the bottle 72, which is shown by water line 112.

As can be seen from this figure, the cartridge 82 nests within the neck 74 of bottle 72, and the flange 90 is located adjacent to the top of the neck 102. The cap 78 has a female thread 104 to engage the male  
5 thread 76, so that the cap 78, cartridge 82 and the bottle 72 are in close fitting arrangement with each other. The close fitting arrangement can be such that there is a seal formed between the cartridge 82 and the mouth 80, which prevents the ingress of foreign matter into the bottle 72.

The button 98 is attached to the cap 78 via a hinge 106 and at an opposite end it is connected by a moveable joint 108. There is only a small amount of plastic at joint 108 which connects the button 98 to  
10 cap 78 so as to enable the application of pressure, such as by a person using their thumb to break the joint 108 and move the button 98 in the direction of arrow 110. Breakage of the moveable joint 108 further indicates that the container 70 has been tampered with.

In use, a retaining band or cap if present needs to be removed and then a force is applied to button 98 which breaks the moveable joint 108. The button 98 moves towards the cartridge 82 (as shown by  
15 arrow 110) until the lower portion of button 98 makes contact with top foil 88. The top foil 88 deforms under the application of force from button 98 and the force is transmitted through to the soluble powder 100, causing the bottom foil 84 to rupture. Upon rupturing, the powder 100 is released from cavity 94 into the liquid water 112 and the two substances are thereby mixed.

Referring now to Figure 10, there is shown an embodiment similar to that of Figure 9, however in this  
20 embodiment there is shown a piercing element in the form of an annular cutting member 114. This cutting member assists the breakage of the bottom foil 84 by piercing the bottom foil 84. This is particularly advantageous for when substances such as liquids are contained within cavity 94 so that the liquid may flow out. Furthermore, it may be advantageous to have a cutting member 114 when a high strength material is used for the rupturable membrane 84 which may require a greater force in order to  
25 cause rupturing.

In both the embodiments of figures 8A, 9 and 10 the cartridge 86 can be used to seal the neck 74 with the bottom foil 84 forming part of the seal. In such an arrangement the cartridge 86 effectively "corks" the bottle 72 with the cap 78 maintaining the corking force on the cartridge 86.

Referring now to Figure 11, there is shown another version of the cartridge 82 containing a soluble  
30 vitamin tablet 118, however in this version, instead of a cutting member 114 as used in the version of figure 10, there is a series of puncture prongs 116 that are connected to the wall of the cartridge 82 at hinge 120. In this version, each of the prongs 116 are able to move (as shown by the arrow in phantom) and rupture the bottom foil 84 so as to create a series of piercings therein, thus forming a line or points of weakness. The advantage of this configuration is that only a very small force need be applied to the

button 98 so as to allow the tablet 118 to pass through bottom foil 84. The four equally spaced prongs located around the periphery of cavity 94 require a reduced amount of force in order to cut a hole through the bottom foil 84.

Referring to Figures 13, 14 and 15, there is shown yet another embodiment similar to that of Figure 8 with like parts being like numbered to the parts of figure 8. The cartridges 82 of figures 13, 14 and 15 differ from that of fig 8 in that they are fitted to nest within the cap and not to the mouth of the bottle 72 and does not contact the bottle 72.

The cartridge 82 includes a chamfered edge 82A, which allows the cartridge 82 to easily push past barb shaped flange 86A on cap 86. The cartridge 82 is pushed into cap 86, with the top surface 86B engaging a stop or stops 86B on cap 86. Once this happens a shoulder 82C on the cap 82 has passed the flange 86A thus preventing the cartridge 82 from disengaging from cap 86.

In the version of figure 13, the button 98 is made from an extendible membrane 98A which will remain intact and sealed even when stretched. Adhered to membrane 98A is a relatively rigid disc 98B which will allow a substantially even pressure to be exerted onto the contents of cartridge 82. The cartridge 82 in the version of figure 13 extends into the neck 80 of bottle 72. Whereas the embodiment of figure 15 is relatively less extensive. This difference in extension can be varied according to the type of substance contained by cartridge 82.

It should be noted that the invention can be used for a number of substances to be mixed together. For example, the substance within bottle 72 may be milk and the soluble substance held within cavity 94 might be chocolate powder, coffee powder, or tea. Furthermore, the substance within cavity 94 may be still water and the soluble substance within cavity 94 could be medicine or vitamins. Additionally, it should be also noted that the substance within cavity 94 does not necessarily have to be a soluble substance, it may be an insoluble substance such as for example cereals which could be directly transferred to milk held within the vessel 72. One advantage of such instant delivery is the fact that the delivery can take place without any contaminants coming into contact with the capsule.

It will be appreciated that an advantage of having the capsule or cartridge in place of the means by which substances were transferred in their prior art, is that the capsule can be sold as a separate item and simply added to the bottle 70 used in conjunction with the cap. Such an application might also include carbon dioxide gas which could be used to be injected into the contents of a bottle so that the contents becomes carbonated.

It will be further appreciated that the application of force to the contents of the cartridges or capsules need not be by only by direct application of force by a persons finger. For example, a hydraulic or pneumatic means (not illustrated), could be provide such as a reservoir of fluid (not illustrated), which has communicable passage with the top membrane of the cartridge, so that when the reservoir is

squeezed, there will be applied a required force to rupture the rupturable membrane. The version of figure 1 requires direct application, while the version of figures 8 to 15 require a mechanical interaction.

The above described embodiments of the invention can be used in any appropriate situation, which includes but is not limited to: precooked foods such as lasagne and parmesan, meal with gravy, pre  
5 cooked pasta and fresh sauce, salads and dressing; yoghurt and fruit; yoghurt and cereal; a breakfast kit; ice cream and fruit and or nuts or topping; hair colours; horticulture; carbonated or still drinks; sports drink; milk drinks; alcoholic cocktails; medicinal and herbal uses to deliver sterile product to disaster and relief areas; baby formula; tomato juice with additives such as salt, pepper, tabasco etc.

The foregoing describes embodiments of the present invention and modifications, obvious to those  
10 skilled in the art can be made thereto, without departing from the scope of the present invention.



**Claims**

1. A container for mixing a first and a second substance, the container including:
  - a vessel defining a chamber adapted to receive the first substance, an opening being provided in the vessel, the opening having closure formations thereon;
  - 5 a closure member for closing the opening in the vessel, the closure member having cooperant closure formations thereon adapted to engage with the closure formations on the vessel, and actuation means on the closure member;
  - a cartridge adapted to be located in or adjacent said opening, said cartridge defining a cavity which is adapted to receive the second substance, the cartridge including a  
10 rupturable membrane;
  - the actuation means being adapted to be actuated so as to rupture the membrane and thereby cause the second substance to discharge from the cavity, through the opening, into the chamber.
2. A container according to claim 1, wherein the cartridge is clamped between the closure member  
15 and the vessel when the closure member is operatively engaged with the vessel.
3. A container according to either preceding claim wherein the vessel is of bottle or jar shape having a cylindrical neck and the cartridge is shaped to nest within the neck.
4. A container according to claim 3, wherein the closure formations on the vessel have screw threads formed on the outer surface of the neck, and closure formations on the cap include  
20 cooperant screw thread formations.
5. A container according to claim 3 or claim 4, wherein the cartridge includes a hollow body and the rupturable membrane is sealed to the end of the body near to said chamber.
6. A container according to claim 5, wherein the cartridge includes an outwardly extending flange which is adapted to be clamped between the vessel and the closure member when the closure  
25 member is operatively engaged with the vessel.
7. A container according to claim 1, wherein the cartridge further includes a top membrane which sealingly encloses the second substance within the cylindrical body.
8. A container according to claim 7, wherein the top membrane includes a deformable sheet material which is adapted to deform when the actuation means is actuated.
- 30 9. A container according to claim 8, wherein the top membrane includes or is a fluid impervious material.

10. A container according to claim 9, wherein the rupturable membrane includes or is a metal foil material.
11. A container according to any preceding claim, wherein the rupturable membrane includes lines of weakness.
- 5 12. A container according to any preceding claim, wherein the closure member is provided with a tamper evident device.
13. A container according to claim 1, wherein the actuation means is a button attached to the closure member at one end by a hinge, and at the other by a moveable end.
14. A container according to claim 13, wherein the moveable end includes one or more breakable tabs.
- 10 15. A container according to any one of the preceding claims, wherein actuation of the actuation means is applied by one of the following: manually; hydraulically; pneumatically; mechanically.
16. A container according to any one of the preceding claims, wherein the cartridge further includes a piercing element that contacts the rupturable membrane.
- 15 17. A container assembly surrounding a space, said assembly having at least one wall portion providing a chamber containing a substance to be delivered to said space, and a frangible diaphragm separating said chamber from said space, said wall portion being deformable so that a user can apply pressure to said diaphragm to thereby rupture same.
- 20 18. A container assembly according to claim 19, wherein said assembly includes a container and lid, with said lid providing said wall portions.
19. A container assembly according to claim 20, wherein said lid includes a body, which body provides means to secure the lid to the container.
- 25 20. A container having: a hollow body to receive a first substance, said body having at least one portion containing a sealable opening therein; and a closure means adapted to engage and thereby seal said sealable opening, said closure means including a securing portion that engages the body to secure the closure means thereto, a chamber to enclose a second substance to be delivered to the first substance, said chamber being at least partly defined by a rupturable membrane separating the chamber from the interior of said body, said membrane being rupturable by pressure being applied thereto to enable said second substance to be delivered to the first substance via said sealable opening.
- 30 21. A container according to claim 22, wherein said membrane is attached to said housing.

22. A container according to claim 23, further including a cover removably attached to said body.
23. A closure means adapted to be secured to a sealable opening in a container, said closure means including: a securing portion that engages the container so as to secure the closure means to the container; a chamber formed from a rupturable membrane portion and a deformable wall portion to enclose a substance to be delivered to the interior of the container, said rupturable membrane separating the chamber from the interior of the container, said membrane being rupturable by pressure being applied to said deformable portion, so as to enable said substance to be delivered to the interior of the container; and said chamber being received by said closure means and being secured in or adjacent to said sealable opening by said closure means being secured to said container.
24. A method of delivering a first substance to a space within a container, the container having at least one wall portion that is deformable and is located adjacent the space, the wall portion located adjacent a frangible diaphragm so as to thereby form a sealed chamber, the frangible diaphragm separating the chamber from the space, the method including the first step of providing said first substance within the chamber and then the second step of applying pressure to the wall portion so that the frangible diaphragm ruptures and releases the first substance into the space.
25. A container as claimed in any one of claims 1 to 15 wherein said closure member includes a locking or retaining band or cap, which must first be removed before said actuation means can be actuated.
26. A method as claimed in claim 24, wherein said sealed chamber is contained within a capsule or cartridge.
27. A method of sealing a container containing a first substance said method include the steps of:
- 1) Providing a cartridge or capsule having a second substance, said cartridge or capsule being size to sealingly fit into or over an opening in said container.
  - 2) Positioning said cartridge into said closure member or said opening.
  - 3) Applying said closure member to said container.
  - 4) Securing said closure to said container thereby forcing said cartridge to seal said opening.
28. The container of claim 20, wherein said closure means includes a closure body having means to engage said hollow body to secure the closure means thereto.
29. A container according to any one of claims 8, 9 or 10, wherein the top membrane or rupturable membrane is made from a laminate of metal foil and a flexible material.

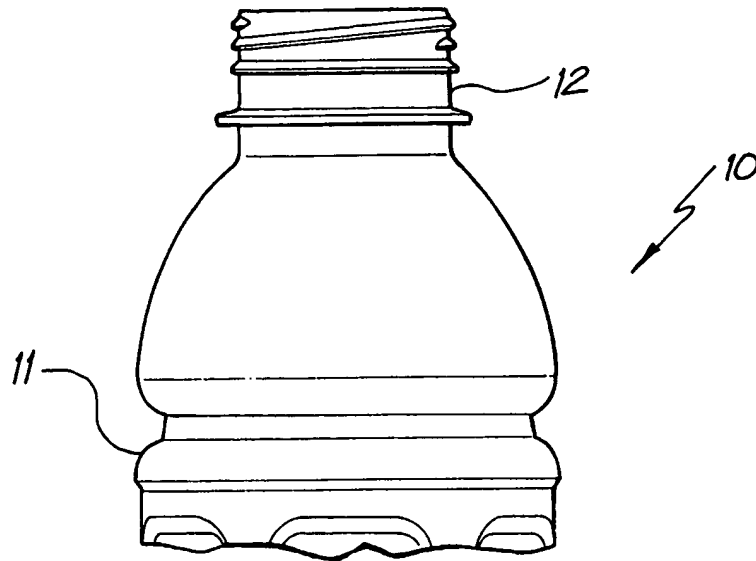


FIG. 1

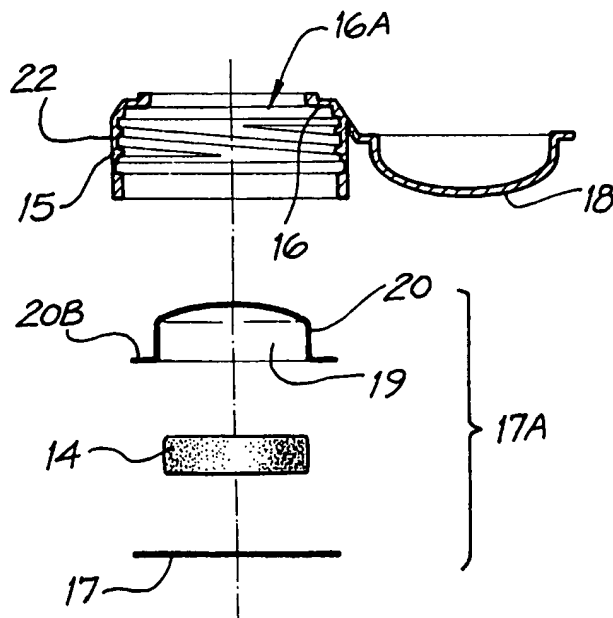


FIG. 2

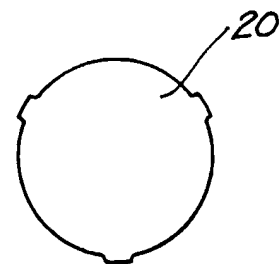
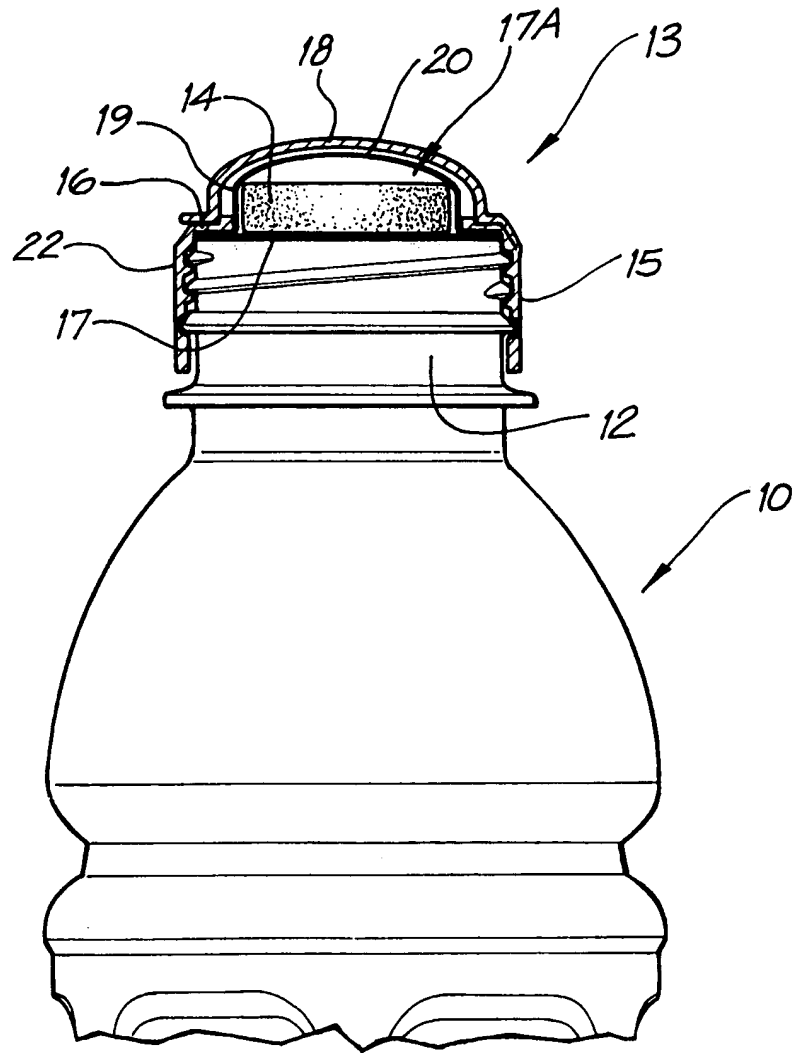


FIG. 2A

**FIG. 3**

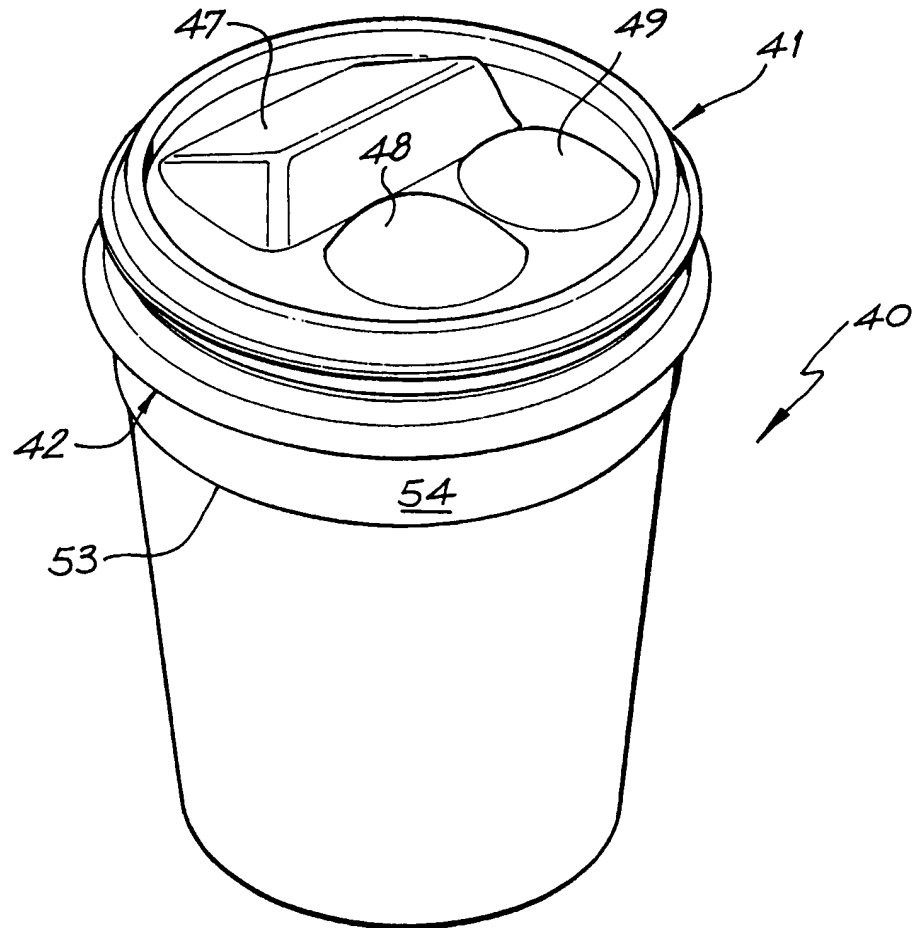


FIG. 4

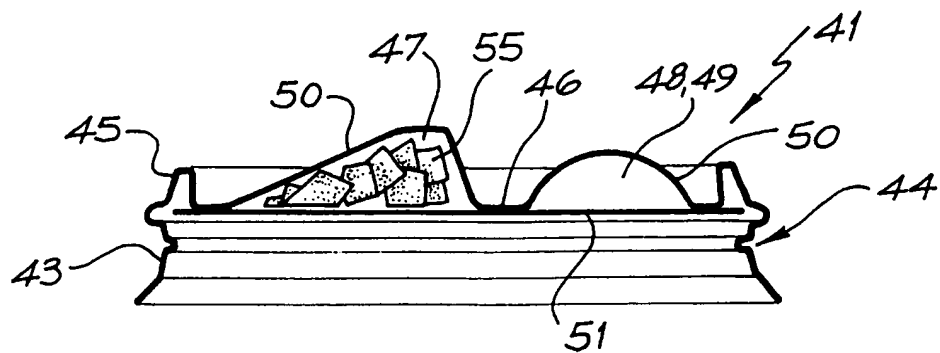


FIG. 5

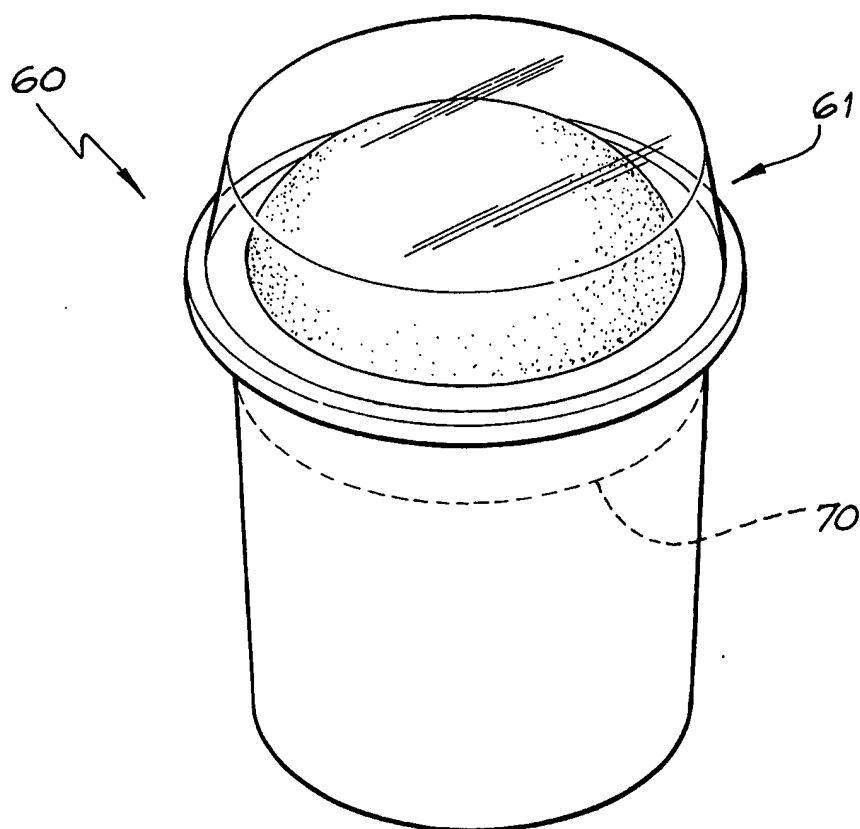


FIG. 6

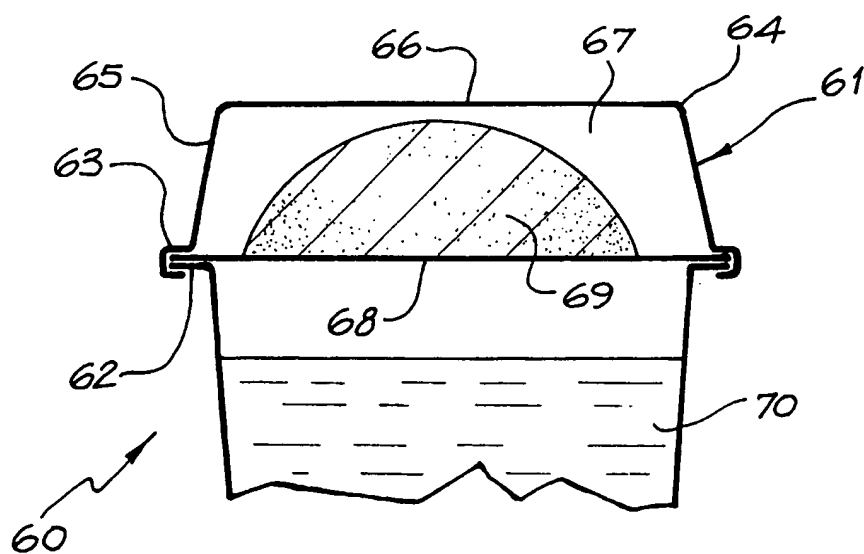
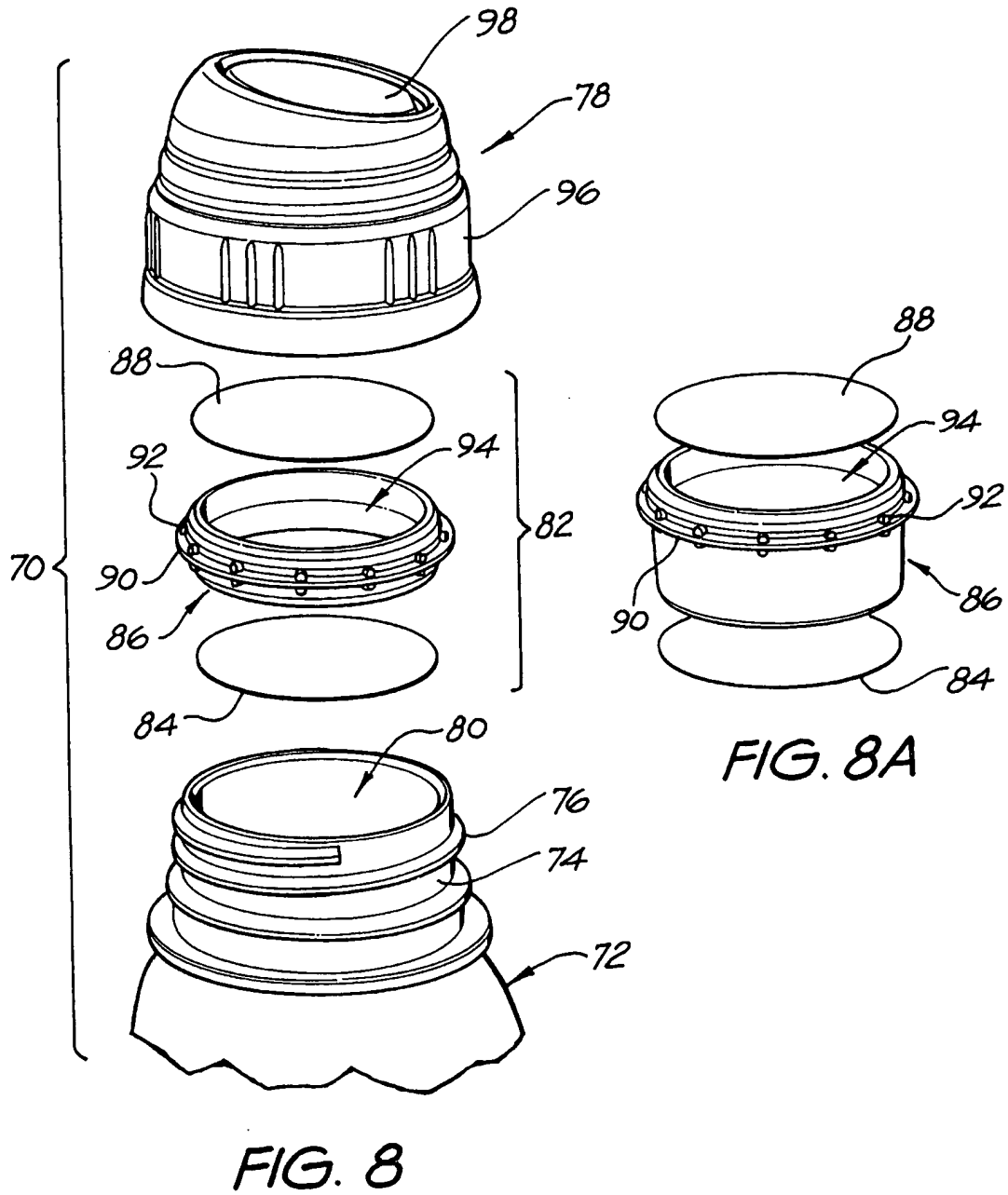
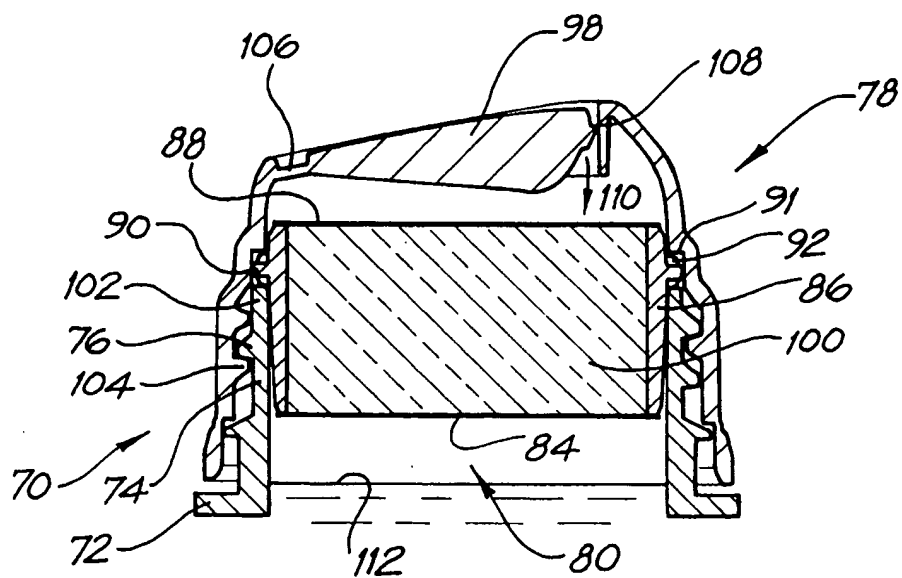
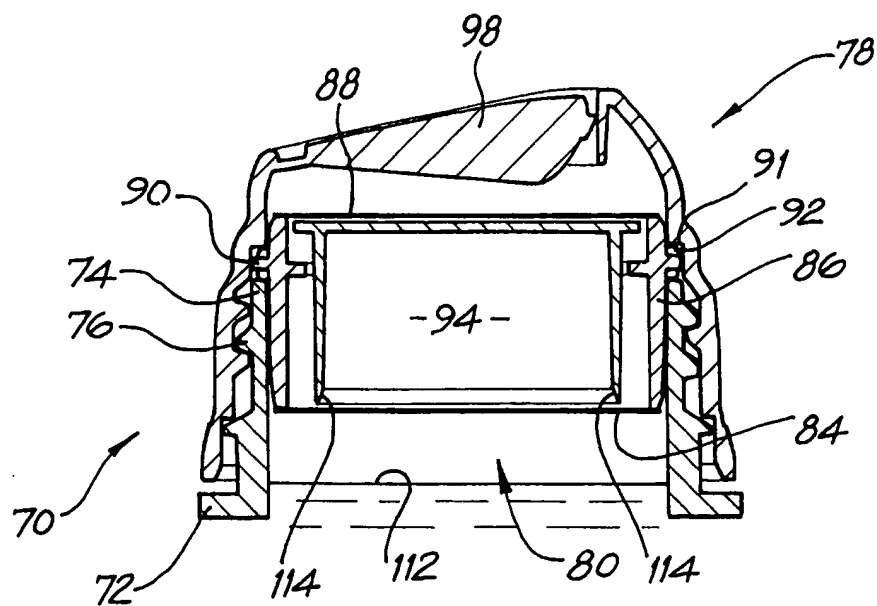


FIG. 7





**FIG. 9****FIG. 10**

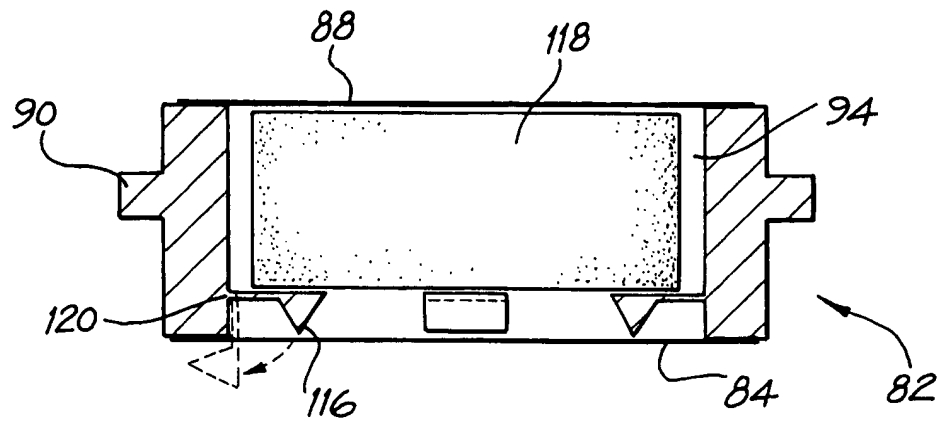


FIG. 11

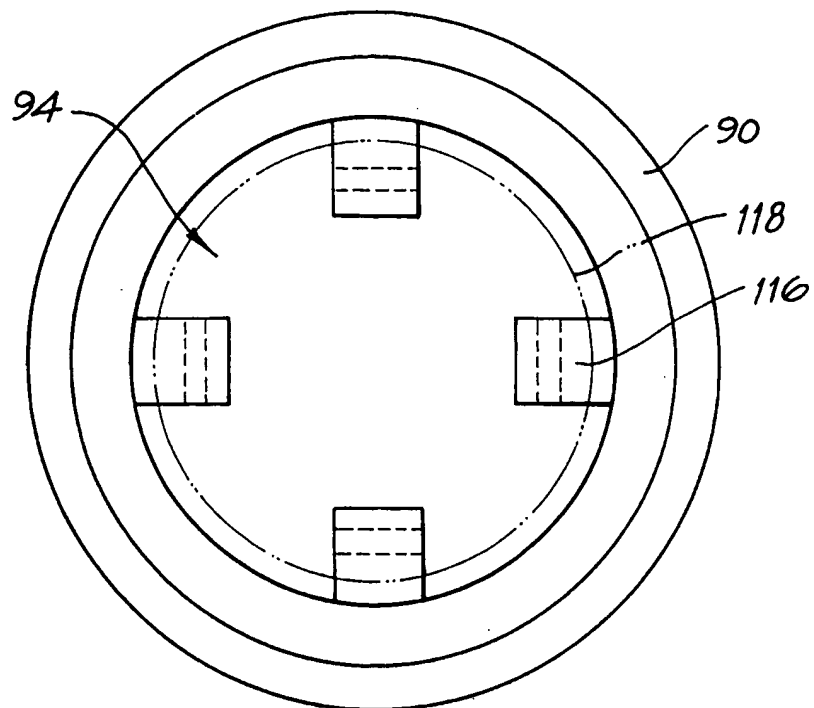
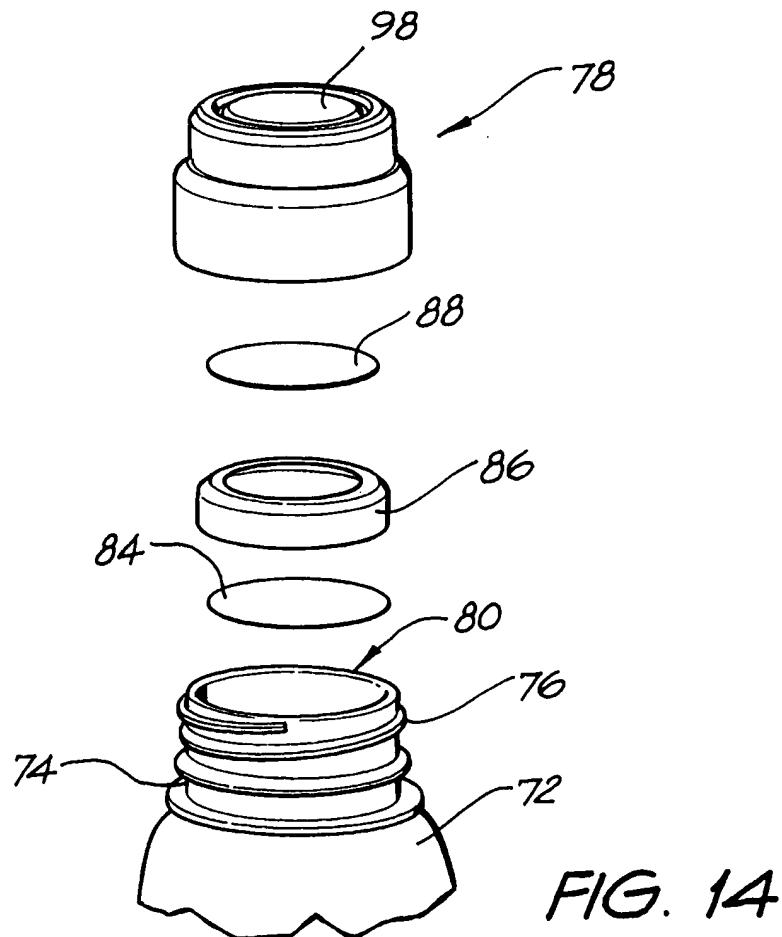
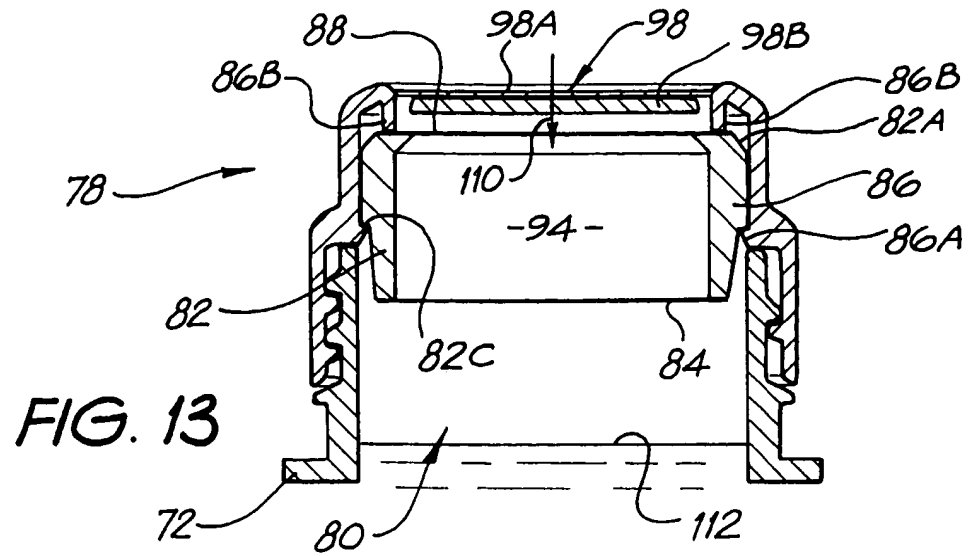
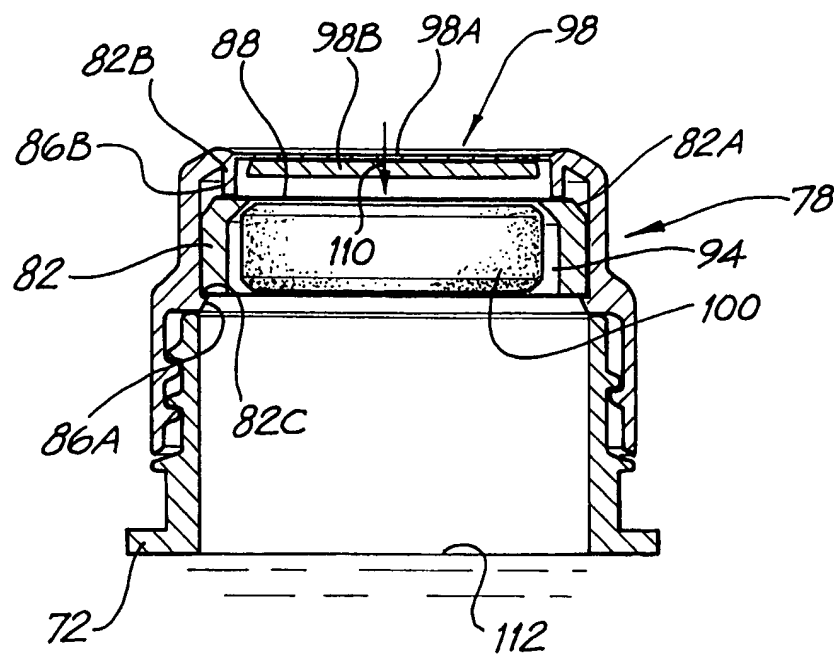


FIG. 12



**FIG. 15**

# INTERNATIONAL SEARCH REPORT

International application No. \_\_\_\_\_

PCT/AU 99/00138

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>					
Int Cl <sup>6</sup> : B65D 25/08, 81/32, 17/00, 51/28					
According to International Patent Classification (IPC) or to both national classification and IPC					
<b>B. FIELDS SEARCHED</b>					
Minimum documentation searched (classification system followed by classification symbols) IPC6: B65D 23/04, 25/08, 81/32, 51/22, 51/20, 51/28					
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched					
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT: (membrane or diaphragm) and (rupture or break or pierce or frangible)					
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>					
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.			
X	GB 2012714 A (OY G.W. SOHLBERG AB) 1 August 1979 See abstract, Figure 1	1-29			
X	EP 0248973 A (OY G.W. SOHLBERG AB) 16 December 1987 See abstract, Figure 4	1-29			
X	US 5431276 A (LIALIN) 11 July 1995 See abstract, figure 6	1-29			
<div style="display: flex; justify-content: space-between;"> <span><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C</span> <span><input checked="" type="checkbox"/> See patent family annex</span> </div>					
<p>* Special categories of cited documents:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; vertical-align: top;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 33%; vertical-align: top;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p> </td> <td style="width: 33%;"></td> </tr> </table>			<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>	
<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>				
Date of the actual completion of the international search 30 March 1999		Date of mailing of the international search report <b>12 APR 1999</b>			
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (02) 6285 3929		Authorized officer  <b>KARYN MURRAY</b> Telephone No.: (02) 6283 2510			

# INTERNATIONAL SEARCH REPORT

International application No. -

PCT/AU 99/00138

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2019820 A (SIGMA TAU INDUSTRIE FARMACEUTICHE RIUNITE S.p.A) 7 November 1979 See abstract, Figures 1 and 2	1-29
X	US 5255812 A (HSU) 26 October 1993 See abstract, Figure 6	1-29
X	US 5035320 A (PLONE) 30 July 1991 See abstract, Figure 6	1-29
X	WO 97/09242 A (EROS) 13 March 1997 See abstract, Figure 1a, 1b	1-29
P,X	DE 29800794 U (TEUCHERT) 23 April 1998 See Figures 2 and 3	1-29
P,X	FR 2759980 A (BRAS) 28 August 1998 See abstract	1-29
X	Derwent Abstract Accession No 87-358673/51, class Q32 Q34, JP 62260679 A (KNEO) 12 November 1987 See abstract	1-29

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 99/00138

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

The different inventions are :

1. Claims 1-16, 25, 29 directed to a container for mixing two substances where there is provided actuation means for rupturing the membrane.

(continued)

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 99/00138

### Box II

2. Claims 17-19, 23,24, 26 directed to a container with closure means and a method of delivering a substance where a deformable wall portion is provided.
3. Claims 20-22, 28 directed to a container where the membrane is rupturable by pressure.
4. Claim 27 directed to a method of sealing a container where the cartridge seals the opening.



**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

International application No.  
**PCT/AU 99/00138**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
GB	2012714	DE	2900297	DK	162/79	FI	780136
		NO	790129	SE	7900284		
EP	0248973	CN	86108677	DK	189/87		
US	5431276						
GB	2019820	DE	2917281	FR	2424197	IT	1095010
		NL	7903308	US	4195731		
US	5255812	GB	2277800				
US	5035320	US	5147337	US	5076425		
WO	97/09242	HU	70693	AU	69405/96	CA	2231277
		EP	850175	PL	325414		
DE	29800794						
FR	2759980	FR	2759975				

END OF ANNEX